

1. **DESCRIPTION:** Understand the anatomy and physiology of the **nervous**, excretory and digestive system.
A TEAM OF UP TO: 2 **APPROXIMATE TIME:** 50 Minutes
2. **EVENT PARAMETERS:** Each **team** may bring **only** one 8.5" x 11" two-sided page of information in any form from any source and up to 2 non-programmable, non-graphing calculators.
3. **THE COMPETITION:** Students should know the basic anatomy and physiology of the **nervous**, excretory and digestive systems and how aging and specific diseases affect them. Process skills expected may include data collection, making observations, inferences, predictions, calculations, analyses and conclusions. The test may include various formats (e. g., timed stations, written test, PowerPoint slides, anatomical specimens, etc.) **limited** to the following topics:

a. **DIGESTIVE SYSTEM - All levels should know:**

- i. Functions of the digestive system
- ii. Basic anatomy of the component parts of the alimentary canal and accessory organs of digestion
- iii. Anatomy of the four layers of the wall of the alimentary canal
- iv. Comparison of the lining of the esophagus, stomach, small intestine and large intestine
- v. Compare and contrast mechanical and chemical digestion
- vi. Physiology of chemical digestion of proteins, fats and carbohydrates
- vii. The effects of exercise on the digestive system
- viii. The diseases on each level from the cell to the whole person as listed: stomach & duodenal ulcers, cancers of the digestive system, diarrhea, lactose intolerance, hepatitis, appendicitis



National Level Only:

- ix. Additional diseases: diverticular disease, GERD, Crohn's Disease and celiac disease
- x. The function of the liver and pancreas in the digestive system. How Kupffer cells work
- xi. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)

b. **EXCRETORY SYSTEM - All levels should know:**

- i. Basic anatomy of the urinary system including kidneys, ureters, bladder, and urethra
- ii. Structure and function of the nephron
- iii. Formation of urine, GFR calculation, and concepts of tubular secretion and absorption
- iv. Understand the effects of ADH
- v. Understand disorders: Obstructive disorders, UTI's, Glomerular disorders, Renal failure

National Level Only:

- vi. Additional diseases: Incontinence, Prostatitis, and BPH (Benign Prostatic Hypertrophy)
- vii. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)

c. **NERVOUS SYSTEM - All levels should know:**

- i. The Brain and Sense Organs - major regions and their functions
- ii. Identification of simple encephalographic wave forms
- iii. Neural Impulses - Cellular anatomy and physiology of glial and supporting cells, synapses and neurotransmitters, action potential generation and propagation, ionic basis of the cellular membrane potential, cellular anatomy and physiology of neurons
- iv. Central Nervous System - organization of the spinal cord, purpose/functions of sleep
- v. Peripheral Nervous System - neuroganglia, action of sensory and motor neurons, understand differences in and purposes of parasympathetic, sympathetic, somatic, and sensory systems
- vi. Disorders: Epilepsy, seizures, Alzheimer's Disease, Multiple Sclerosis and Parkinson's Disease, shingles (herpes zoster), cerebral palsy, glaucoma, pink eye (conjunctivitis)
- vii. Effects of drugs: alcohol, caffeine, nicotine, and marijuana on the nervous system

National Level Only:

- viii. The Brain - anatomy and physiology of brain function including function and role of specific nuclei clusters and tracts, theories of dreaming, purpose and principles of MRIs and EEGs, Neural Impulses - Retrograde signaling
- ix. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)



Recommended Resources: All reference and training resources including the in-depth **Anatomy and Physiology CD (APCD)** and the introductory **Bio/Earth CD (BECD)** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>

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